

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



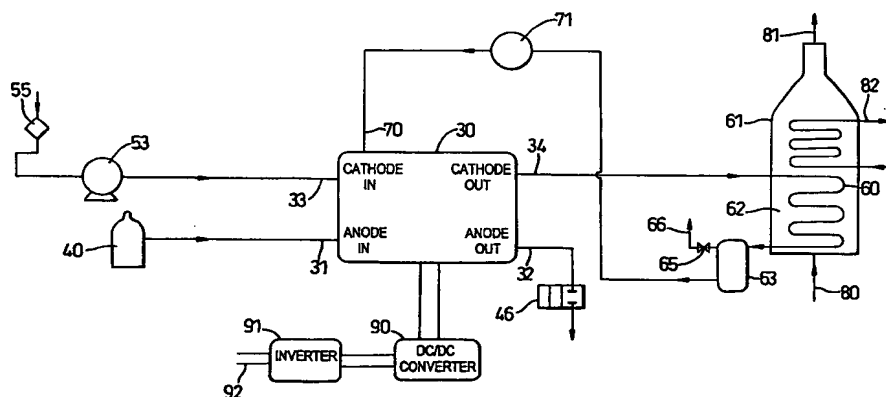
(43) International Publication Date
10 June 2004 (10.06.2004)

PCT

(10) International Publication Number
WO 2004/049481 A2

- (51) International Patent Classification⁷: **H01M 8/00** Limited, 42 Brook Street, Mayfair, London W1K 5DB (US).
- (21) International Application Number: PCT/GB2003/005057 (74) Agent: **CHARIG, Raymond**; Eric Potter Clarkson, Park View House, 58 The Ropewalk, Nottingham NG1 5DD (GB).
- (22) International Filing Date: 20 November 2003 (20.11.2003) (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 0227263.1 22 November 2002 (22.11.2002) GB (84) Designated States (*regional*): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- (71) Applicant (*for all designated States except US*): **INTELLIGENT ENERGY LIMITED** [GB/GB]; Rolls House, 7 Rolls Buildings, Fetter Lane, London EC4A 1NH (GB).
- (72) Inventors; and
- (75) Inventors/Applicants (*for US only*): **HOOD, Peter, David** [GB/GB]; Intelligent Energy Limited, 42 Brook Street, Mayfair, London W1K 5DB (GB). **MITCHELL, Philip, John** [GB/GB]; Intelligent Energy Limited, 42 Brook Street, Mayfair, London W1K 5DB (GB). **ADCOCK, Paul, Leonard** [GB/GB]; Intelligent Energy Limited, 42 Brook Street, Mayfair, London W1K 5DB (GB). **COLE, Jonathan** [US/US]; Intelligent Energy
- Published:**
— without international search report and to be republished upon receipt of that report
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: THERMAL ENERGY MANAGEMENT ELECTROCHEMICAL FUEL CELLS



(57) Abstract: A fuel cell assembly supplies water and water vapour by-product to a cooling water circuit delivered to a thermal storage tank from which it can be recycled to the fuel cell stack as direct input to the membrane electrode assemblies, for use as fuel/oxidant preheat and/or direct water injection to the membrane electrode assembly. The purity of water delivered to the membrane is thereby assured. The thermal storage tank allows for a decoupling of the thermal and electrical loads on the fuel cell stack in a combined heat and electrical power delivery unit. Under low external electrical loads, the fuel cell stack and its cooling circuit may be used at high capacity to provide hot water.